

SDMS DocID

443273

# DECLARATION FOR THE EXPLANATION OF SIGNIFICANT DIFFERENCES PINE STREET CANAL SUPERFUND SITE BURLINGTON, VERMONT April 2009

#### Site Name and Location

Pine Street Canal Superfund Site, Burlington, Vermont

Superfund Records Center
SITE: PSA STATE
BREAK: S.4
OTHER: 44773

#### Lead Agency

United States Environmental Protection Agency (EPA)

#### **Support Agency**

Vermont Department of Environmental Conservation (VT DEC)

#### **Statement of Purpose**

This decision document sets forth the basis for the determination to issue the attached Explanation of Significant Differences (ESD) for the Pine Street Canal Superfund Site (VTD980523062). EPA developed this decision document after consulting with VT DEC. The State of Vermont's letter of concurrence is provided as Attachment B.

#### Statutory Basis for Issuance of the ESD

Pursuant to Section 117(c) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9617(c), and the National Contingency Plan, 40 C.F.R. § 300.435(c)(2)(i), if EPA determines that the remedial action to be undertaken at a site differs significantly from the Record of Decision (ROD) for that site, EPA shall publish an explanation of the significant differences and the reasons such changes are being made. According to 40 C.F.R. § 300.435(c)(2)(i), and EPA guidance (Office of Solid Waste and Emergency Response (OSWER) Directive 9200.1-23-P, July 1999), an ESD, rather than a ROD amendment, is appropriate where the adjustments being made to the ROD are significant but do not fundamentally alter the remedy with respect to scope, performance or cost.

EPA has determined that the adjustments to the ROD provided in this ESD are significant but do not fundamentally alter the overall remedy for the Pine Street Canal Superfund Site with respect to scope, performance, or cost. Therefore, this ESD is being properly issued.

In accordance with Section 117(d) of CERCLA, 42 U.S.C. § 9617(d), and the rules at 40 C.F.R. §§ 300.435(c)(2)(i)(A) and 300.825(a)(2), this ESD will be available for public review at the EPA Records Center in Boston, Massachusetts and the public information repositories located at the Fletcher Free Public Library and Bailey-Howe Library at the University of

Vermont, both in Burlington. EPA issued the ESD in draft form to allow for public review and comment. Written comments were accepted between December 22, 2008 and January 27, 2009. A responsiveness summary is included as Attachment C.

#### Background

The remedy selected in the 1998 ROD for Pine Street Canal included capping contaminated sediments within the canal and contaminated soil in emergent wetlands, effectively isolating the contamination below the biologically-active zone. Land-use restrictions were put in place to prohibit potable use of groundwater, prevent unsafe contact with contaminated soil below five feet, and prevent certain land uses that could result in unacceptable human-health risk such as residential or children's day care. Long-term performance monitoring of the constructed cap, groundwater, surface water, stormwater entering the Site, and sediments in the canal and wetlands was also a component of the remedy.

Construction of the cap was completed in March 2003. In June 2003, oily sheens and globules of coal tar (collectively referred to as nonaqueous phase liquid or NAPL) were observed floating on the surface water in the canal. Pools of NAPL were also found underwater on the surface of the cap and at ground level in an uncapped area immediately adjacent to the canal. In the summer of 2004, the cap was extended over a portion of the west bank of the canal where historic cribbing and the root system of dead trees were pathways for NAPL migration.

The expanded cap appeared to have addressed the releases, until oily sheens and globules of coal tar were once again observed floating on the surface water in the canal in the spring of 2005. In 2006, a five-year review of the protectiveness of the remedy was conducted, as required by the NCP and the ROD. EPA determined that, with the exception of the performance of the cap at the southern end of the canal, the remedial actions were generally functioning as intended by the ROD. At the southern end of the canal, the cap performance standard for the isolation of contaminants was not being met.

Field investigations to evaluate the rate at which NAPL is being released, its distribution, and the mechanisms of release were conducted by the Performing Defendants in 2006 and 2007. In 2008, the Performing Defendants evaluated options that could be implemented as partial replacement for, augmentation of, or addition to the existing cap to prevent NAPL from seeping into the canal.

#### Overview of the ESD

The 1998 ROD called for the subaqueous cap to be constructed of sand and silt. During remedial design, a geotextile layer was added to the bottom of the cap to prevent the sand and silt from slumping into and mixing with the very soft, contaminated sediments at the bottom of the canal. A geogrid layer was also added to support the weight of construction equipment.

Studies conducted since 2005 show that, at the southern end of the Site (between transects T9 and T13, approximately), NAPL that lies beneath the canal is migrating upwards, through these materials, and into the water column, where benthic organisms, fish and other wildlife can come

into contact with it. Significant NAPL seepage into the canal has occurred. Absorbent booms placed across the canal prevent the contamination from migrating to Lake Champlain which is a source of drinking water for the City of Burlington.

This ESD provides that, in the areas where the seepage is occurring, the existing cap will be redesigned and reconfigured to capture the NAPL before it is released to the canal. The new cap will require more maintenance and monitoring than that originally selected in the ROD.

#### Declaration

For the foregoing reasons and as explained herein, by my signature below, I approve the issuance of an Explanation of Significant Differences for the Pine Street Canal Superfund Site in Burlington, Vermont, and the changes stated therein.

anes T. Owens, III, Director

Office of Site Remediation and Restoration

U.S. Environmental Protection Agency - Region 1

## EXPLANATION OF SIGNIFICANT DIFFERENCES PINE STREET CANAL SUPERFUND SITE BURLINGTON, VERMONT April 2009

Site Name:

Pine Street Canal Superfund Site

Site Location:

Burlington, Vermont

Lead Agency:

United States Environmental Protection Agency (EPA)

**Support Agency:** 

Vermont Department of Environmental Conservation (VT DEC)

#### I. INTRODUCTION

This Explanation of Significant Differences (ESD) is being issued for the Pine Street Canal Superfund Site to address differences between the remedial action being undertaken there and the remedy that was set forth in the Record of Decision (ROD) for the Site on September 29, 1998. EPA is required to publish an ESD by Section 117(c) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9617(c), and the rule at 40 C.F.R. § 300.435(c)(2)(i).

The remedy selected in the 1998 ROD included placing a sand and silt cap over contaminated sediments in the canal and turning basin that posed an unacceptable ecological risk. Construction of the cap was completed in March 2003. In the summer of 2004, the cap was extended over a portion of the western bank of the canal, after it was discovered that coal tar and oil (collectively referred to as nonaqueous phase liquid or NAPL) was migrating along historic cribbing and the root systems of dead trees, accumulating in pools on the ground surface and the surface of the underwater cap.

Oily sheens and globules of coal tar were once again observed floating on the surface water at the southern end of the canal in the spring of 2005. Studies conducted by defendants responsible for the implementation of the clean up, under the supervision of EPA and VT DEC, determined that NAPL is migrating upwards through the existing cap, into the water column.

This ESD calls for a modification of the cap to address the ongoing migration of NAPL. In areas where NAPL is seeping (between transects T9 and T13 approximately, as shown on figure 1), the cap will be partially replaced and/or augmented with a new cap system that will capture NAPL before it is released into the canal. The NAPL that accumulates will periodically be removed and shipped off site for treatment or disposal in an approved facility.

In accordance with CERCLA §117(d), 42 U.S.C. § 9617(d), and the rules at 40 C.F.R. §§ 300.435(c)(2)(i)(A) and 300.825(a)(2), this ESD and its supporting documents have been added to the Administrative Record for the Site and are available for public inspection at the following locations:

EPA New England Records Center One Congress Street, Suite 1100 Boston, Massachusetts 02114-2023 By appointment only: 617-918-1440

Fletcher Free Public Library Reference Desk 235 College Street Burlington, Vermont 05401 802-865-7217

Bailey-Howe Library Special Collections University of Vermont Burlington, Vermont 05405 802-656-2138

EPA issued this ESD in draft form to allow for public review and comment. Written comments were collected between December 22, 2008 and January 27, 2009. A responsiveness summary is included as Attachment C.

#### II. SITE HISTORY, CONTAMINATION, AND THE SELECTED REMEDY

The Pine Street Canal Superfund Site is located between Pine Street and the eastern shore of Lake Champlain, about half a mile south of downtown Burlington. Vermont. The Site consists of an abandoned barge canal and turning basin, stormwater management areas, vegetated wetlands and uplands. The canal is hydraulically connected to Lake Champlain and is subject to seasonal flooding when lake levels are high. The upland areas along Pine Street and Lake Street are zoned for enterprise (light manufacturing); however, the majority of the 38-acre Site is vacant and is used occasionally by trespassers. The wetlands and open water along the lakefront are zoned recreation/greenspace and conservation. Groundwater beneath the Site has been classified by the State of Vermont as Class IV, making it unpotable and suitable for agricultural or commercial uses only.

The Site has been used for various industrial/commercial purposes since the mid-1800s when the railroad on the western edge of the canal was built. The barge canal and turning basin were first dredged in 1868 to provide access to Lake Champlain for several lumber companies, a coal company, and a boat builder. By 1879, two slips for barges, one running north from the turning basin, the second running east towards Pine Street from the middle of the canal, had also been constructed.

Around 1895, Burlington Gas Works, a manufactured gas plant (MGP), was constructed on Pine Street, just north of what is now the Burlington Electric Department. The plant used a coal gasification process to manufacture gas for the city. Burlington Gas Works reportedly disposed of large quantities of coal gasification wastes, such as coal tar, fuel oil, contaminated wood chips, iron oxide, cinders, and associated contaminants such as cyanide and metals, on site and in

the wetlands behind the plant. These waste materials are the primary source of contamination at the Site.

Disposal practices at the MGP, as well as the operations of other industries at the Site, have resulted in the infilling of wetlands and peaty soils at much of the Site. The gas plant ceased operations in 1966 and was dismantled in 1967. By 1977, both barge slips had been filled in. Naturally occurring processes, such as deposition, eutrophication, and sediment trapping in large root mats, continued to fill in the canal and turning basin.

The first observation of visible contamination on surface water was documented in 1926, when a daily log book for the MGP noted that light tar from the plant's tar well was running into the lake. A series of oily releases to the canal occurred in the late 1960s and early 1970s. In 1977 and 1978, the State of Vermont took exploratory borings for the Southern Connector highway that was proposed to be constructed on the Site. The borings revealed extensive subsurface contamination.

The Site was proposed for the Superfund National Priorities List (NPL) on October 23, 1981 and was listed on September 8, 1983. In 1985, EPA undertook an emergency removal action at the former Maltex Pond (figure 1). VT DEC provided field oversight. Six to eighteen inches of soil contaminated with coal tar were removed from the surface, mixed with limestone, solidified, and shipped off site for disposal at an approved facility. A permeable geotextile membrane was placed over the excavated area, and topped with clean topsoil. Contaminated soil was left in place below the geotextile membrane.

The Vermont Agency of Transportation continued their investigations of the proposed Southern Connector right-of-way until 1988 when EPA took the lead for site investigations. In November 1992, EPA proposed a cleanup plan for the Site. The plan included dredging contaminated sediments and placing them in a containment/disposal facility (CDF) built on site, and, collecting mobile coal tar and oil. Public comment on the 1992 proposed plan was negative. Commenters were critical of certain aspects of EPA's remedial investigation, including the nature and extent of ecological risk at the Site, the migration of contaminated groundwater, and air quality. Commenters were also concerned about the short-term health effects of excavation and the construction of a large CDF on the shores of Lake Champlain. After a six-month comment period, EPA withdrew the proposed cleanup plan.

In 1993, environmental regulators, the potentially responsible parties (PRPs), and other citizens and groups who had been active in commenting on the 1992 proposed plan formed the Pine Street Barge Canal Coordinating Council (PSBCCC). The PSBCCC's mission was to design and oversee the implementation of additional studies to fill in data gaps in the remedial investigation, and to recommend a remedy for the Site to EPA. Under the oversight of EPA and the State of Vermont, and with involvement of the PSBCCC, additional studies of the Site were performed by the PRPs between 1994 and 1998. In 1993, the State of Vermont reclassified the groundwater from drinking water to commercial and agricultural uses only. This action removed a significant pathway for human exposure and the primary focus of the Site shifted from human-health to ecological risk. In late 1997, the PSBCCC recommended a remedy for the Site. EPA adopted the recommendations of the PSBCCC, and in May 1998, released a second proposed cleanup

plan for public comment. In September 1998, EPA issued the ROD for the Site, selecting the remedy recommended by the PSBCCC.

The remedy set forth in the 1998 ROD for the Pine Street Canal Site included the following:

- capping contaminated sediments in the canal and turning basin with sand and silt;
- capping contaminated sediments in emergent wetlands with sand and top soil;
- construction of a weir at the mouth of the turning basin where it enters Lake Champlain
- improving on-site stormwater managements features;
- habitat restoration:
- mitigating adverse effects from the remedy, if any, on historically-significant structures;
- establishing and monitoring compliance with deed restrictions that prohibit potable use of groundwater, prevent unsafe contact with contaminated soil below five feet, and prevent certain land uses that could result in unacceptable human-health risk (e.g., residential, children's day care);
- long-term compliance monitoring of groundwater, surface water, stormwater, sediment and performance monitoring of the cap; and
- performing five-year reviews of the remedy to ensure that it remains protective.

On February 11, 2000, a Consent Decree was entered in United States District Court for the State of Vermont between EPA, VT DEC and the PRPs. In it, three Performing Defendants agreed to implement the remedy selected in the 1998 ROD. Groundwater monitoring, pre-design studies and pilot tests began in the fall of 2000. Construction began in October 2001 with the concrete weir built at the outlet to Lake Champlain. The reconfiguration of on-site stormwater features and capping emergent wetlands took place over the summer and fall of 2002.

Experience and information gathered during construction of a waterway between wetlands and the canal indicated that it would be feasible and advantageous to apply the sand directly over the sediments in a dewatered canal rather than from a hopper on a barge, as originally planned. Further, it was determined that construction during the winter season would take advantage of increased sediment strength due to freezing, as well as accelerate the overall remedial action schedule. Construction of the cap was completed in March 2003 and the canal and turning basin were slowly inundated with water, in advance of spring flooding.

In June 2003, oily sheens and globules of coal tar were observed floating on the surface water at the southern end of the canal. Pools of coal tar were also found accumulating underwater on the surface of the sand cap and at ground level in an uncapped area immediately adjacent to the canal. Absorbent booms (which still remain) were placed across the canal to prevent the contamination from migrating to Lake Champlain. In the summer of 2004, the cap was extended over a portion of the west bank of the canal where historic cribbing and the root systems of dead trees acted as pathways for NAPL migration. The expanded cap seemed to be working to control the release of NAPL until oily sheens and globules of coal tar were once again observed floating on the surface water at the southern end of the canal in the spring of 2005.

In 2006, a five-year review of the protectiveness of the remedy was conducted, as required by the ROD. EPA determined that with the exception of the performance of the subaqueous cap in the

southern portion of the Site, the remedial actions are functioning as intended by the ROD. The cap performance standard that is not being met is for the isolation of contaminants. The five-year review report can be found in the public repositories mentioned above and as a link from EPA's Pine Street website at <a href="https://www.epa.gov/ne/superfund/sites/pinestreet">www.epa.gov/ne/superfund/sites/pinestreet</a>.

The Performing Defendants conducted field investigations under the supervision of EPA and the VT DEC in 2006 and 2007 to evaluate the rate at which NAPL is being released, its distribution, and the mechanisms of release. In 2008, the Performing Defendants evaluated options that could be implemented as partial replacement for, augmentation of, or addition to the existing cap to prevent NAPL from seeping into the canal. The results of the investigation and evaluation of remedial options can be found in two reports entitled *Final NAPL Investigation Report* (February 1, 2008) and Final NAPL Controls Report (June 20, 2008). These reports are included in the Administrative Record for the Site, and are available as links from EPA's Pine Street website and in the public repositories.

#### III. BASIS FOR THIS ESD

Performance standards for the subaqueous cap in the southern portion of the canal (between T9 and T13, approximately) are not being met. In these areas, the cap has not effectively isolated the contamination. NAPL that lies beneath the canal is migrating upwards, through the cap and into the water column, where benthic organisms, fish and other wildlife can come into contact with it. Significant NAPL seepage into the canal has occurred. If absorbent booms were not in use, contamination could migrate to Lake Champlain, which is a source of drinking water for Burlington, at levels of concern.

Studies conducted in 2006 and 2007 indicate that a primary mechanism for the release of NAPL in the area between T9 and T13 is gas ebullition. The organic-rich canal sediments beneath the installed cap are generating gas, presumed to be methane. As the gas passes through the contaminated sediments, it can become coated with NAPL. Coated bubbles pass through the sand cap and when they hit the surface of the water and burst, an oily sheen is left behind. The path that the gas takes through the sand can act as a pore through which additional coal tar can migrate. Depending on the density of the coal tar, it either accumulates with the sheens on the water surface (see figure 2), or sinks and accumulates on the cap surface.

#### IV. DESCRIPTION OF SIGNIFICANT DIFFERENCES

The capping materials specified in the ROD for the subaqueous cap were sand and silt. During remedial design, a geotextile layer was added to the bottom of the cap to prevent the sand and silt from slumping into and mixing with the very soft, contaminated sediments at the bottom of the canal. A layer of geogrid was also added to support the weight of construction equipment.

In those areas where the scepage of contaminants is occurring (T9 to T13, approximately), this ESD provides that the existing cap will be redesigned and reconfigured to intercept and sequester the NAPL, preventing its release into the canal. The specifications for the new cap profile and the selection of materials for the cap will be finalized during design. It is expected that the new cap will include a high-permeability layer that will facilitate passive collection and removal of

NAPL and reduce the gas pressure gradient. In addition to the performance standards for the isolation of contaminants set forth in the 2000 Consent Decree<sup>1</sup>, the new cap will be evaluated against the following design criteria:

- ability to control the release of NAPL into the canal;
- ability to reduce contaminant loading to and through cap materials in the biologically-active zone;
- ability to limit the replacement of the layer(s) in which NAPL is sequestered;
- ease of removal of NAPL and change-out of materials in which NAPL is sequestered; and
- 30-year minimum design life.

One possible design for the reconfigured cap is described as "Alternative 2" in the June 2008 Final NAPL Controls Report. Alternative 2 would modify the existing cap between T9 and T13, approximately, with the addition of two new layers. The first would be a comprised of high-permeability, lightweight material (e.g., pumice) in which slotted pipes would be laid to facilitate NAPL capture and removal. This layer would be covered with a reactive cap in which an absorbent material (e.g., organoclay) at the core of the cap binds with the contaminant and prevents its release. When the capacity of the absorbent material is reached, the reactive cap must be replaced. However, it is expected that most of the migrating NAPL would accumulate in the underlying high-permeability layer before it reached the reactive cap, thereby minimizing the need for change-out. The new cap with its NAPL capture layer would require a more complex operation and maintenance program than did the original sand cap.

Some microdredging of the existing sand cap is expected during installation of the new cap to remove NAPL-impacted cap material and maintain a weight balance so as not to trigger additional consolidation of the native sediment. Microdredging is also need to minimize changes to the canal profile and to maintain, to the extent practicable, the original elevation of the bottom of the canal.

EPA expects that other possible designs, in addition to Alternative 2, will be considered during the design of the reconfigured cap. Regardless of the final design of the reconfigured portion of the cap, the monitoring program will also be more comprehensive than that required under the 1998 ROD. Operation, maintenance and monitoring programs will be developed during remedial design.

The remaining components of the original remedy remain unchanged.

<sup>&</sup>lt;sup>1</sup> The subaqueous cap shall prevent contact between the contaminated sediments and benthic organisms and fish in the biologically-active portion of the benthic habitat (1-10 cm) at ecologically harmful levels. It shall be a barrier to the effects of bioturbation. It shall prevent or minimize the migration of contaminants from the contaminated sediments through the cap.

Cap materials shall be selected and applied so as to isolate ecological receptors from the contaminated soils and sediments that will remain in place below the cap. Cap thickness, after settling and compaction, shall be sufficient to prevent exposure of benthic organisms that recolonize the cap to underlying contaminants. Increases in the elevation of the bottom of the canal shall be minimized. The water column shall be maintained at sufficient depth to minimize the potential for cap erosion.

#### Change in Expected Outcomes

It is expected that the new cap will meet the performance standard for isolation of contamination. Consistent with EPA's February 2, 2002 guidance entitled *Principles for Managing Contaminated Sediments at Hazardous Waste Sites*, OSWER directive 9285.6-08, which was issued after the Pine Street Canal ROD, this ESD is a part of an iterative approach. If new information indicates that site assumptions should be re-evaluated, EPA may require additional measures to address the isolation of contamination performance standard in the future.

All other expected outcomes remain unchanged.

#### V. Support Agency Comments

VT DEC participated with EPA in developing the changes to the selected remedy described herein. A letter of concurrence is included as Attachment B.

#### VI. Statutory Determinations

EPA believes that the remedy as adjusted herein remains protective of human health and the environment and satisfies the requirements in Section 121 of CERCLA. The changes made in this ESD have not changed the remedial action objectives for the Site. Rather, the modifications to the remedy described herein will allow the remedy to continue to perform in a cost-effective, practicable manner while meeting all of the statutory requirements of CERCLA.

#### VII. Public Participation Compliance

In accordance with Section 117(d) with CERCLA and Section 300.825(a) of the NCP, this ESD will become part of the Site's Administrative Record which is available for public review at the locations identified in the introduction to this document.

Although a formal comment period is not required when issuing an ESD, in this instance, given the considerable public involvement in the remedy selected in 1998, EPA issued the ESD in draft form to allow for public review and comment. Written comments were accepted between December 22, 2008 and January 27, 2009. A responsiveness summary documenting EPA's responses to questions and comments raised during the comment period are included as Attachment C. Two sets of comments were received, however only one was treated as a formal submittal for purposes of the responsiveness summary. Copies of both sets of written comments can also be found in Attachment C.

As required by the NCP, EPA will also publish a notice of availability and a brief description of this ESD in a major local newspaper of general circulation following the signing of this ESD.

Attachment A – Figures

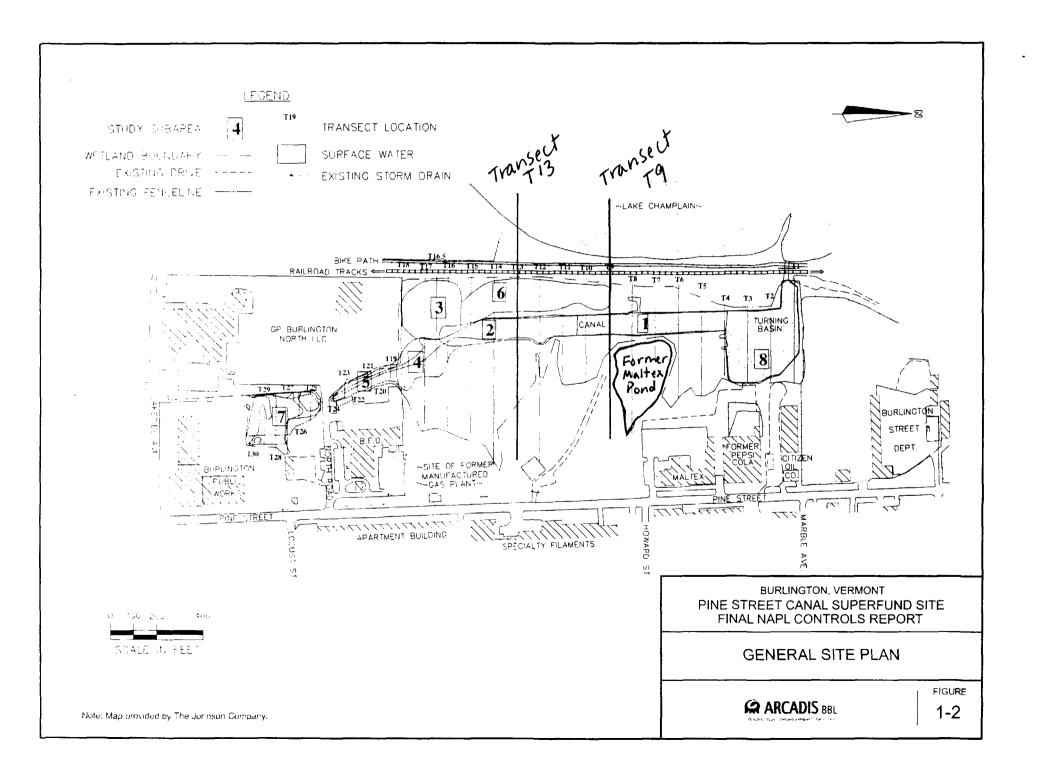
Attachment B – VT DEC Concurrence Letter

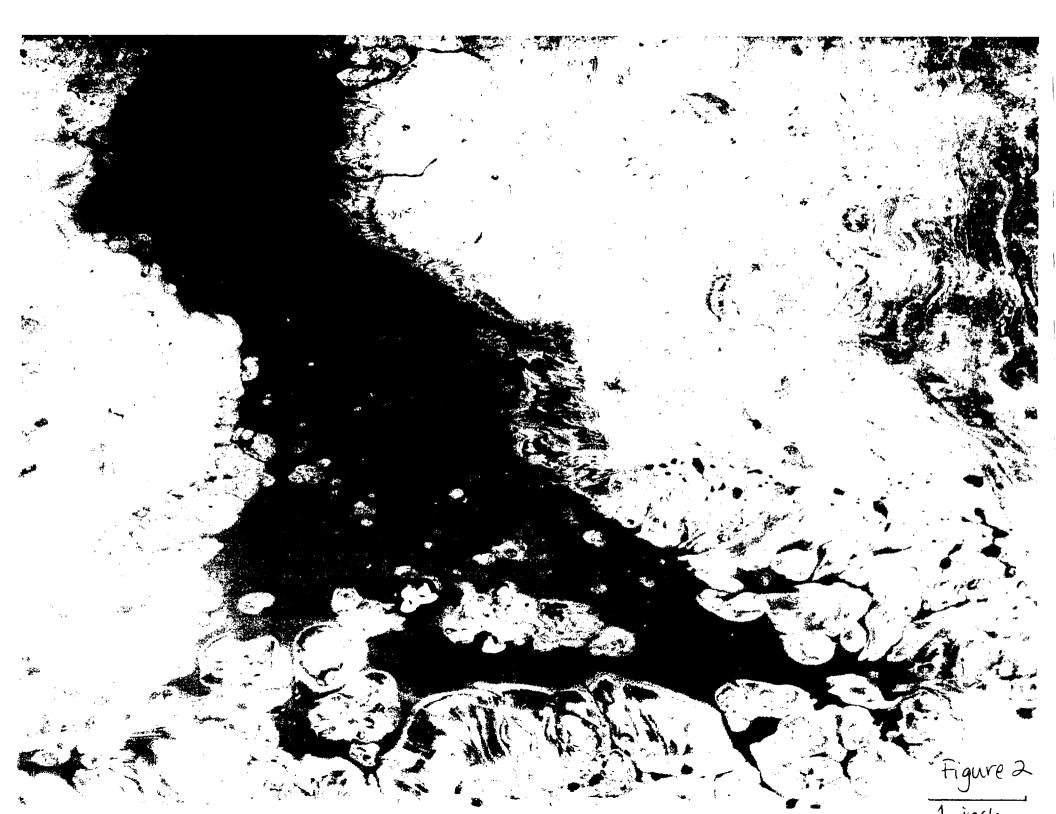
Attachment *C* – Responsiveness Summary

Attachment D – ESD Administrative Record Index

### Attachment A

Figures





## Attachment B VT DEC Concurrence Letter



#### Vermont Department of Environmental Conservation

ment of Environmental Conservation

Commissioner's Office

103 South Main Street, 1 South

[phone] 802-241-3808

Waterbury, VT 05671-0401

[fax] 802-244-5141

January 12, 2009

James T. Owens, Director
Office of Remediation and Restoration
US EPA Region I
1 Congress Street, Suite 1100
Boston, MA 02114-2023

Subject:

December 2008 Explanation of Significant Difference for the Pine Street Barge

Agency of Natural Resources

Canal Superfund Site Burlington, Vermont (State Site #1977 0042)

Dear Mr. Owens:

We concur with the December 2008 Explanation of Significant Differences (ESD) proposed by EPA to modify the remedy for the Pine Street Barge Canal from what was described in the 1998 EPA Record of Decision (ROD).

The remedial alternative selected in the ROD for the barge canal specified that in part, a clean sand cap would be installed in the barge canal to prevent contaminants including Non Aqueous Phase Liquids (NAPL) related to on-site disposal of "coal tar" wastes from migrating into the canal. Since the installation of the sand cap in 2003, NAPL has been migrating through the sand cap. We agree that the proposed ESD is a modification of the remedy such that the cap will be partially replaced and/or augmented with a new cap system that will capture the NAPL before it is released into the canal. The NAPL that accumulates will periodically be removed and shipped off site for treatment or disposal in an approved facility. With this option, the remedy can better achieve optimal compliance with the remedial objectives for the barge canal.

Please do not hesitate to contact me or Michael Smith of my staff if you need additional information or clarification on our response to the ESD.

Sincerely.

Laura Q. Pelosi

Commissioner

Cc: Mary Jane O'Donnell, EPA

Karen Lumino, EPA

Michael B. Smith, VI DEC

O. Loloh.

# Attachment C Responsiveness Summary

## Responsiveness Summary for the Explanation of Significant Differences Pine Street Canal Superfund Site April 2009

The U.S. Environmental Protection Agency (EPA) held a 36-day comment period between December 22, 2008 and January 27, 2009, to provide an opportunity for public review and comment on the differences between the remedial actions proposed here and the remedy that was set forth in the Record of Decision (ROD) for the Site on September 29, 1998. The purpose of a responsiveness summary is to document EPA's responses to the questions and comments raised during the public comment period.

The remedy selected by the 1998 ROD called for placing a sand and silt cap over contaminated sediments in the canal and turning basin. Construction of the cap was completed in 2003. In 2004, the cap was extended over a portion of the western bank of the canal, after it was discovered that coal tar and oil (collectively referred to as nonaqueous phase liquid or NAPL) was migrating to the surface along historic cribbing and the root system of dead trees. Oily sheens and globules of coal tar were once again observed floating on the surface water at the southern end of the canal in 2005. Under this Explanation of Significant Differences (ESD), in areas where NAPL is seeping (between transects T9 and T13, approximately), the cap will be partially replaced and/or augmented with a new cap system that will capture NAPL before it is released into the canal. The NAPL that accumulates will periodically be removed and shipped off site for treatment or disposal in an approved facility.

The draft ESD and its supporting documentation were added to the Administrative Record for the Site and were made available for public review at the following locations:

EPA New England Records Center One Congress Street, Suite 1100 Boston, MA

Fletcher Free Public Library 235 College Street Burlington, VT

Bailey-Howe Library University of Vermont Burlington, VT

EPA issued a press release on December 17, 2008, announcing the dates of the comment period and the availability of the Administrative Record. In addition, EPA mailed the draft ESD to members of the Pine Street Barge Canal Coordinating Council and other interested parties on December 12, 2008. Two sets of comments were received during the comment period; however only one (*de maximis, inc*) was treated as a formal submittal for purposes of this responsiveness summary. Copies of both sets of written comments are attached.

#### Comment 1

EPA states that "the rate of NAPL seepage is significant and is estimated to be at least 111 kg/year." The Performing Defendants wish to clarify that this calculated number is not reflective of a measured amount of NAPL entering the Canal annually. Rather this number is a calculated amount based on several observations and conservative assumptions exclusively for the purpose of selecting and designing NAPL controls.

#### EPA Response to Comment 1

EPA will modify the ESD to read as follows: "Significant NAPL seepage into the canal has occurred."

#### Comment 2

EPA states that "...the new cap will include a high-permeability layer that will reduce the gas gradient..." The purpose of the horizontal permeable barrier in Alternative 2 of the Final NAPL Controls Report is to collect NAPL, not to control the gas gradient. Control of the gas gradient is neither a design objective nor a performance goal.

#### EPA Response to Comment 2

The Performing Defendants state that "NAPL migration via gas bubble-induced transport appears to be the most significant of the potential ongoing NAPL migration pathways and is the primary pathway that the NAPL controls must address." (*Final NAPL Investigation Report*, ARCADIS BBL and HartCrowser Inc, February 1, 2008.) EPA agrees – addressing the gas-ebullition pathway is crucial to the long-term performance of the remedy.

The success of Alternative 2 to control the gas-ebullition pathway rests entirely on the ability of gas to pass through the horizontal permeable barrier into the overlying reactive core mat. If the reactive core mat at a given location is blocked due, for example, to biological fouling or the active material in the mat having reached its absorptive capacity, the gas will seek an alternative path. In the short-term, the gas is likely to move laterally along the bottom of the reactive core mat until it can find a vertical pathway. However, over time, as gas has to travel laterally greater and greater distances, or lateral migration is impeded by differential settlement of the amended cap, the gas pressure gradient at a localized seepage point may build up to the point where the cap is breached and breakthrough occurs.

While the primary function of the horizontal permeable barrier layer may be to collect and allow for the removal of NAPL, EPA believes that Alternative 2 can be modified to reduce the gas pressure gradient that could accumulate in that layer. Vents, for example, tied into the layer along its terminus, could minimize the potential for gas buildup and subsequent breakthrough, and are a relatively low cost and low maintenance item.

No changes will be made to the ESD in response to this comment.

#### Comment 3

Although one objective of the dredging will be to minimize changes in the Canal profile and maintain original cap surface elevation, there are two other objectives: remove NAPL impacted cap material, and maintain a weight balance so as not to trigger additional consolidation.

#### EPA Response to Comment 3

Agreed. The ESD has been modified to include these two additional objectives.

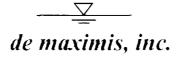
#### Comment 4

EPA states that it expects that other possible designs, in addition to Alternative 2 from the Final NAPL Controls Report, will be considered during the design of the reconfigured cap. While the Performing Defendants agree that certain details of the design (i.e., areal extent of the cap, thickness of cap layers) will be evaluated and finalized during the design process, the design will nonetheless employ those technologies (RCM cap and horizontal permeable barrier) identified in Alternative 2 in the Final NAPL Controls Report. The Performing Defendants will not be evaluating designs that differ materially from that presented in Alternative 2 of the NAPL Controls Report.

#### EPA Response to Comment 4

The NAPL Controls Report presented only a conceptual design for Alternative 2. If, during a rigorous design review process, EPA makes the determination that Alternative 2 either cannot be constructed in a manner that will not significantly impact the canal ecosystem and/or will not meet performance standards, the Performing Defendants will be asked to propose a new design. EPA reserves its right to propose, select, and enforce any additional remedial measures required to address releases of NAPL.

No changes will be made to the ESD in response to this comment.



135 Beaver Street, 4<sup>th</sup> Floor Waltham, MA 02452 (781) 642-8775 FAX (781) 642-1078

January 26, 2009

#### Via Federal Express

Ms. Karen Lumino United States Environmental Protection Agency Mail Code: HBT 1 Congress Street Boston, MA 02114

RE: Comments on Explanation of Significant Differences (ESD)
Pine Street Cana; Superfund Site, Burlington, Vermont

Dear Ms. Lumino:

On behalf of the Performing Defendants, this letter transmits the Performing Defendants' comments on the Draft Explanation of Significant Differences (ESD) for the Pine Street Canal Superfund Site, Burlington, Vermont.

- Article III Basis for this ESD, first paragraph, fourth sentence: EPA states, "The rate of NAPL seepage is significant and is estimated to be at least 111 kg/year." The Performing Defendants wish to clarify that this calculated number is not reflective of a measured amount of NAPL entering the Canal annually. Rather, this number is a calculated amount based on several observations and conservative assumptions exclusively for the purpose of selecting and designing NAPL controls.
- 2. Article IV Description of Significant Differences, page 6, first paragraph: EPA states that "....the new cap will include a high-permeability layer that will reduce the gas gradient...". The purpose of the horizontal permeable barrier in Alternative 2 of the Final NAPL Controls Report is to collect NAPL, not to control the gas gradient. Control of the gas gradient is neither a design objective nor a performance goal.
- 3. Article IV Description of Significant Differences, page 6, second paragraph after bullet list: Although one objective of the dredging will be to minimize changes in the Canal profile and maintain original cap surface elevation, there are two other objectives: remove NAPL impacted cap material, and maintain a weight balance so as not to trigger additional consolidation.

—¥ de maximis, inc.

Ms. Karen Lumino United States Environmental Protection Agency January 26, 2009 Page 2

4. Article IV - Description of Significant Differences on page 6, third paragraph after bullet list: EPA states that it expects that other possible designs, in addition to Alternative 2 from the Final NAPL Controls Report, will be considered during the design of the reconfigured cap. While the Performing Defendants agree that certain details of the design (i.e. areal extent of the cap, thickness of cap layers) will be evaluated and finalized during the design process, the design will nonetheless employ those technologies (RCM cap and horizontal permeable barrier) identified in Alternative 2 in the Final NAPL Controls Report. The Performing Defendants will not be evaluating designs that differ materially from that presented in Alternative 2 of the NAPL Controls Report.

Sincerely,

de maximis, inc.

Thor Helgason
Project Coordinator for the Pine Street Canal Performing Defendants

FILE: 3144 / Pine Street/ESD Comment Letter 0120091.doc



#### AquaBlok, Ltd.

Corporate/Research & Development Office 3401 Glendale Avenue Suite 300 Toledo, Ohio 43614

Phone: (800) 688-2649 Fax (419) 385-2990

E-mail Address: services@aquablokinfo.com

Website Address: www.aquablokinfo.com

January 13, 2008

Ms. Karen Lumino, RPM EPA New England 1 Congress Street Suite 1100 (HBT) Boston, MA 02114

RE: Pine Street Canal - ESD and Final NAPL Controls Report

#### Dear Karen:

The purpose of this message is not to provide formal comments on the ESD, but simply to make sure to clarify certain aspects regarding the capabilities and potential performance of our materials in the type of application that we discussed at Pine Street Canal. I felt compelled to send you this information after doing a more full and complete reading of the June Final NAPL Controls Report referenced above.

Since our meeting in September, it is my hope that you have a better understanding of the product's capabilities and recognize that there are statements and conclusions in the June Final NAPL Controls Report regarding AquaBlok that are simply not correct. However, I'd like to specifically make the following points:

- 1. In Section 2, subsection 2.2.1 Containment Technologies, the paragraph titled Low Permeability Caps comes to an incorrect conclusion regarding the data referenced in two different reports that relate to our material's performance on the Anacostia River EPA project. The statement that "uplift could potentially cause cracking and jointing of the low-permeability cap" was not a conclusion of the final project results, but appears to simply be a speculative statement by the author of the report. If there is any question as to the EPA's conclusions on this matter, we would encourage you to contact Ed Barth of EPA's Office of Research and Development, who was EPA's primary technical evaluator on the 2007 SITE Evaluation report (Telephone: (513)-569-7669 E-mail: barth.ed@epa.gov).
- 2. In the opening sentence of this same paragraph, the author also concludes that the AquaBlok technology is "potentially effective at controlling NAPL", but, "this technology has seen only limited application". However, this is simply not correct. AquaBlok has been used in multiple pilot and full-scale installations where to objective was to create a barrier for some form of DNAPL or hydrocarbon-based contaminant. The first of these was an MGP Superfund site in St. Louis dating back to 2002. A second significant full-scale project for a creosote remediation was performed in Burnaby, B.C. on the Fraser River in 2003, where AquaBlok was used to as both a low-permeability cap in a wetland restoration setting, but more importantly was used at

Ms. Karen Lumino January 13, 2009 Page 2

the site to vent gas being produced in the sediment layer. A more recent large-scale project was an installation on Chattanooga Creek, at a creosote/coal tar Superfund site completed in 2007 and directed by EPA, Region 4 RPM, Craig Zeller. We would also encourage you or anyone with questions regarding this topic to contact Mr. Zeller directly (Telephone: (404) 562-8827 E-mail: Zeller.Craig@epamail.epa.gov).

3. In Table 2-2 Screening of NAPL Control Technologies, AquaBlok is specifically identified with the conclusion, "Does not meet objective: not impermeable to NAPL seepage". Two comments are important here. First, the stated objective of the report (Section 1.1) is to "identify and evaluate NAPL controls that would prevent or minimize NAPL seepage". Therefore, even with some long-term increase in permeability (i.e. from 10<sup>-9</sup> to 10<sup>-7</sup>), it is not clear that the use of the material as a Low-Permeability barrier, would not meet the objective. Ironically, all of the alternatives more fully evaluated only minimize the likelihood of NAPL seepage through the use of some form of treatment mat, which the authors acknowledge may fail if overloaded with free product. However, it is even more important to note that there was no consideration given to the use of the material in other potential design alternatives, such as combining a low-permeability material with a gas collection system or combining the use of permeable organoclay-based treatment material as a sub-layer to a low-permeability cover layer. We completed just such an application at an MGP site in Region 2 in 2008. As we discussed when we met, there are a number of different design approaches that could be considered, some using a bentonite-based, low-permeability approach to enable better performance and lower cost of an overall approach.

In spite of the Final NAPL Controls Report conclusions regarding AquaBlok, I was happy to see that your ESD leaves open other design alternatives for consideration. As we discussed, I feel that it would not difficult to pilot two or more alternative designs to help evaluate some level of performance as well as issues related to ease of installation, monitoring and removal – as called for in the ESD.

Although we did not talk about cost considerations at my visit, this is clearly another important factor that we noted in the Final NAPL Controls Report. The alternatives that utilize the RCM require multiple layers to achieve what is still not a very thick effective layer of 'active' treatment material. By using the AquaBlok version of organoclay that I discussed with you at our meeting, it is possible to place more active material per square foot for a cost much lower than using multiple layers of RCM. In addition to reducing costs, this approach also provides the following important benefits:

- Thicker layer provides greater protection against breakthrough and longer useful life
- Ease of installation and replacement simple bulk excavation equipment
- Allows for monitoring of entire layer thickness performance with conventional methods

In addition, if the above system is used in conjunction with a low-permeability cover layer (i.e. conventional bentonite-based AquaBlok) and a gas or NAPL extraction system, it is very likely the overall design would result in consolidation of the underlying sediments. Thus maximizing the canal flow way cross-section to increase floodway capacity (a concern noted in the design

Ms. Karen Lumino January 13, 2009 Page 3

section of the June report). Consolidation would also likely minimize or potentially eliminate the need for micro dredging to accommodate the thin capping system – saving another \$400,000 according to the estimates provided.

If you feel that it would be more appropriate to pass these comments along as an 'official' reply to your request for comments on the ESD, please let me know and I'd be happy to recast the message. But, it is more important to me that you and your team have a better understanding of our materials capabilities, when evaluating the ultimate design alternatives.

For more reference material on installed AquaBlok sites, I have enclosed a recently updated installation list. While the list is not complete, it provides a good cross section of the many and varied applications of the material.

Thanks for taking the time to meet and learn more about our technology – we would be happy to meet with the engineering and/or project team at any time to further review some of the other design ideas we discussed. Please feel free to contact me with any questions or comments.

Sincerely,

John A. Collins General Manager/COO

ct: John H. Hull, President

## Attachment D ESD Administrative Record Index

## AR Collection: 61063 PINE ST CANAL ESD AD MIN REC

### AR Collection QA Report \*\*\*For External Use\*\*\*

**05: RECORD OF DECISION (ROD)** 

File Break: 05.03 RESPONSIVENESS SUMMARY FOR EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD) # of Pages: 8 US EPA REGION I Author: Doc Date: 04/01/2009 Addressee: **Bates Number:** Doc Type: REPORT Weston Number: File Break: 05.04 **RECORD OF DECISION (ROD)** 216973 US EPA REGION 1 Author: **Doc Date:** 09/29/1998 # of Pages: 322 Addressee: **Bates Number:** Doc Type: REPORT Weston Number: RECORD OF DECISION (ROD) DRAFT, EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD) 299164 US EPA REGION 1 Author: **Doc Date:** 12/01/2008 # of Pages: 17 Addressee: **Bates Number:** Doc Type: REPORT Weston Number:

### Page 2 of 6

## AR Collection: 61063 PINE ST CANAL ESD AD MIN REC

## AR Collection QA Report \*\*\*For External Use\*\*\*

**05: RECORD OF DECISION (ROD)** 

File Break: 05.04

443273 EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD)

Author:

US EPA REGION 1

Doc Date: 04/07/2009

# of Pages: 31

Addressee:

Bates Number:

Weston Number:

Doc Type: REPORT

**EXP SIGNFICANT DIFF (ESD)** 

07: REMEDIAL ACTION (RA)

File Break: 07.05

263768 REMEDIAL ACTION CONSTRUCTION COMPLETION REPORT, VOLUME 1 OF 2 - (12/21/2006 TRANSMITTAL LETTER ATTACHED)

Author:

JOHNSON COMPANY INC

Doc Date: 11/01/2006

# of Pages: 1592

Addressee:

US EPA REGION 1

VERMONT STATE OF

**Bates Number:** 

Weston Number:

Doc Type: REPORT

299115 PHASE 1 REMEDIAL ACTION CONSTRUCTION COMPLETION REPORTOPERABLE UNIT 01

Author:

JOHNSON COMPANY INC

Doc Date: 01/29/2002

# of Pages: 225

Addressee:

US EPA REGION I

Bates Number:

Weston Number:

Doc Type: REPORT

### AR Collection: 61063 PINE ST CANAL ESD AD MIN REC

**AR Collection QA Report** \*\*\*For External Use\*\*\*

#### **08: POST REMEDIAL ACTION**

File Break: 08.03

FIVE-YEAR REVIEW REPORT 256970

Author: SUSAN STUDLIEN US EPA REGION 1 - OFFICE OF SITE REMEDIATION & RESTORATION

Addressee:

Doc Type: FIVE YR REVIEW RPT & APPROVAL

Doc Date: 10/03/2006 # of Pages: 96

**Bates Number:** 

Weston Number:

File Break: 08.05

FINAL NAPL INVESTIGATION REPORT 291830

Author: GARRY E HORVITZ ARCADIS

Addressee: BARRY L KELLEMS ARCADIS

PHILIP A SPADARO ARCADIS

GREEN MOUNTAIN POWER CORP

**Bates Number:** 

Weston Number:

Doc Type: REPORT

FINAL NAPL CONTROLS REPORT 299105

Author: GARRY E HORVITZ ARCADIS

Addressee: BARRY L KELLEMS ARCADIS

PHILIP A SPADARO ARCADIS

GREEN MOUNTAIN POWER CORP

Doc Type: REPORT

Doc Date: 06/30/2008

**Doc Date:** 02/01/2008

# of Pages: 135

# of Pages: 230

Bates Number:

Weston Number:

#### AR Collection: 61063

#### PINE ST CANAL ESD AD MIN REC

### **AR Collection QA Report**

\*\*\*For External Use\*\*\*

#### 10: ENFORCEMENT/NEGOTIATION

File Break: 10.08

CONSENT DECREE: UNITED STATES DISTRICT COURT OF VERMONT, CIVIL ACTION NO 1:99-CV-366 25918

Author: MARGERY L ADAMS US EPA REGION I

Addressee: ROBERT J CHANEY UGI UTILITIES INC.

PETER CLAVELLE CITY OF BURLINGTON, VERMONT

THOMAS G CORNEIL. GENERAL ELECTRIC CO STANLEY P CYPHERS UHLMANN COMPANY

CANUTE DALMASSE VT DEPT OF ENVIRONMENTAL CONSERVATION

DERRICK DAVIS BCV CORP

DERRICK DAVIS DAVIS DEVELOPMENT CORPORATION

DERRICK DAVIS MALTEX PARTNERSHIP

JOHN P DEVILLARS US EPA REGION 1

C L DUTTON GREEN MOUNTAIN POWER CORP

A DONALD JR GILBERT VERMONT GAS SYSTEMS INC

LINDA HUDSON GENERAL DYNAMICS ARMAMENT SYSTEMS INC

MICHAEL E JANETT CITIZENS PROPERTIES INC

CHERYL A LAFLEUR NEW ENGLAND ELECTRIC SYSTEMS

LINDA D LYNESS SPECIALTY FILAMENTS INC.

L GAUREN MEUTTIA UNITED STATES DISTRICT JUDGE

DENNIS K MORGAN SOUTHERN UNION CO

BRIAN R SEARLES VERMONT AGENCY OF TRANSPORTATION

ERICK TITRUD VT OFFICE OF THE ATTORNEY GENERAL

NORMAN A JR VARNEY LOCKHEED MARTIN CORP

DAVID WALTSON VERMONT RAILWAY

L KEITH WIMBUSH UDV NORTH AMERICA INC

STEVEN H WOOD MAYTAG CORP

Doc Type: ENFORCEMENT SETTLEMENT

Doc Date: 02/11/2000

# of Pages: 82

**Bates Number:** 

Weston Number:

AR Collection: 61063

PINE ST CANAL ESD AD MIN REC

**AR Collection QA Report** \*\*\*For External Use\*\*\*

13: COMMUNITY RELATIONS

File Break: 13.01

LETTER REGARDING DRAFT, EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD) 443261

Author: KAREN LUMINO US EPA REGION I

Doc Type: LETTER

Addressee:

PINE STREET BARGE CANAL COORDINATING COUNCIL **Bates Number:** 

Weston Number:

LETTER REGARDING DECEMBER 2008 EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD)

Author: LAURA Q PELOSI VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Addressee: JAMES TOWENS US EPA REGION I

Doc Type: LETTER

**Doc Date:** 01/12/2008 # of Pages: 1

**Bates Number:** 

Weston Number:

**Doc Date:** 12/12/2008

# of Pages: 3

LETTER REGARDING DECEMBER 2008 EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD) 443263

Author: JOHN A COLLINS AQUABLOK

Addressee: KAREN LUMINO US EPA REGION 1

Doc Type: LETTER

Doc Date: 01/26/2009 # of Pages: 3 4/13/2009

Page 5 of 6

Bates Number:

Weston Number:

## AR Collection: 61063 PINE ST CANAL ESD AD MIN REC AR Collection QA Report \*\*\*For External Use\*\*\*

13: COMMUNITY RELATIONS

File Break: 13.01

443264 COMMENTS ON DECEMBER 2008 EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD)

Author: THOR HELGASON DE MAXIMIS INC

Addressee: KAREN LUMINO US EPA REGION I

Doc Type: LETTER

**Doc Date:** 01/26/2009

# of Pages: 2

**Bates Number:** 

Weston Number:

File Break: 13.03

443265 PRESS RELEASE REGARDING COMMENTS SOUGHT ON REVISED CLEANUP PLAN

Author:

US EPA REGION I

Addressee:

**Doc Type: PRESS RELEASE** 

Doc Date: 12/17/2008

# of Pages: 2

Bates Number:

Weston Number:

File Break: 13.05

260733 FIVE-YEAR REVIEW COMPLETE; FOLLOW-UP ACTION PLANNED

Author:

US EPA REGION 1

Addressee:

**Doc Type:** FACT SHEET

Doc Date: 01/01/2007

# of Pages: 4

Bates Number:

Weston Number:

Number of Documents in Collection: 16